Remarks

This application has been reviewed in light of the Non-Final Office Action of August 17, 2007. Claims 1-18 and 21-22 are pending. Claims 2 and 11 are withdrawn from consideration, and claims 1, 3-10, and 12-18, and 21-22 are rejected. In response, claims 7 and 10 are amended, and the following remarks are submitted.

At page 2, the Office Action states an Examiner Interpretation. The Examiner Interpretation is not correct, because it interprets the word "nominal" as having no meaning, by dropping it from the interpretation.

Ground 1. Claims 1, 3-5, 10, 12-14, and 21-22 are rejected under 35 USC 103 as unpatentable over Chakrabarti U.S. Patent 4,898,624 in view of website www.timet.com/timetal6-4frame.html and Adinolfi U.S. Patent 4,563,239. Applicant traverses this ground of rejection.

MPEP 2142, under ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS, provides: "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]. *See* MPEP para 2143-2143.03 for decisions pertinent to each of these criteria."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure.

Chakrabarti teaches multistep processing including forging. The website www.timet.com/timetal6-4frame.html teaches processing without forging. Thus, these two references are unrelated. There is no basis for combining the teachings of these references.

If the rejection is maintained, Applicant asks that the Examiner set forth the objective basis found in the references themselves for combining the teachings of the references, and for adopting only the helpful teachings of each reference and disregarding the unhelpful teachings of the reference.

The second of the requirements of MPEP 2142 is an expectation of success. There is no expectation of success; this requirement has not been addressed in the explanation of the rejection, and in any event more than Examiner's argument is required here. Furthermore, there can be no expectation of success because Chakrabarti and the website both teach away from the claimed invention.

It is a well-established principle of law that a prima facie case of obviousness may not properly be based on a reference which teaches away from the present invention as recited in the claims.

Chakrabarti has a teaching on thickness of the final forged article. Chakrabarti teaches processing for relatively thin sections of only 1 inch in thickness; *see* the captions to Tables II and IV. Conversely, the invention of Applicant's claimed invention as found in independent claims 1 and 10 requires that the forging be at least 2-1/4 inches in thickness. The website www.timet.com/timetal6-4frame.html teaches that "sections greater than four inches do not effectively respond to solution treat and age (STA) type of heat treatment. Four inches falls into the recited range "at least 2-1/4 inches in thickness." Therefore the website explicitly teaches that such thick sections as recited in the present claims do not respond to solution treat and age processing.

Thus, in light of the teachings of the website, one would therefore be surprised to learn that the forgings of the present invention that are "at least 2-1/4 inches in thickness" (which includes the range greater than four inches) did respond to the recited solution heat treat, water quench, and age processing of the presently claimed invention.

Thus, a person of ordinary skill would be discouraged from using a solution treat and age processing for sections greater than 2-1/4 inches thick by reading the website and would have no expectation of success to achieve different results based on the method of Chakrabarti.

As stated in MPEP 2142, "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]."

Claim 1 recites in part:

> "forging the workpiece to make a forged gas turbine engine component, wherein the forged gas turbine engine component has a thick portion thereof with a section thickness greater than 2-1/4 inches;"

The majority of the Specification addresses the critical nature of this problem of heat treating thick forgings, yet none of the references disclose or fairly suggests the presently claimed processing for such thick-section forgings.

Chakrabarti clearly teaches that its processing is directed to forgings of small thickness, *see* the captions of Tables II and IV, where the forging is taught to be only 1 inch in thickness (only 44 percent of the minimum thickness recited in the claims). This is consistent with the teaching of the website www.timet.com/timetal6-4frame.html that thicker sections of greater than 4 inches do not respond to solution treat and age (even though the website does not deal with forgings in any way). Thus, both Chakrabarti and the website www.timet.com/timetal6-4frame.html teach away from this claim limitation as discussed above.

Claim 1 further recites in part:

> "water quenching the gas turbine engine component to room temperature."

The explanation of the rejection admits that the references have no such teaching (Non-Final Office Action, page 3, 4-5 lines from bottom of page) of quenching to room temperature. While the explanation of the rejection makes some arguments about cooling rate, cooling rate and the final temperature achieved at the end of the water quenching are entirely different things. Cooling rate is the rate of change of temperature with time, and final temperature is the temperature reached at the end of the quenching.

Claim 1 further recites in part:

> "aging the gas turbine engine component at a temperature of from about 900°F to about 1000°F."

Chakrabarti teaches two different aging processes for its thin sections of 1-inch final thickness, *see* col. 3, lines 33-40. Chakrabarti teaches a two-step aging process for thin sections, including a first step of 1275-1525F for 1 hour followed by oil or water quenching, plus 915-950F for 8-24 hours followed by air-cooling, and a one-step aging process for thin sections of 1275-1325F for about 2 hours followed by air cooling. Neither of these aging treatments meets and teaches the quoted claim language.

Claim 1 further recites in part, after the step of heat treating:

> "final machining the forged gas turbine engine component."

None of the references has any such teaching. Chakrabarti and the website www.timet.com/timetal6-4frame.html do not teach final machining at all. Adinolfi mentions final machining, but it has no teaching of final machining after heat-treating as recited in the present claims.

Claim 10 also recites the steps of heat treating, quenching, aging, and final machining, which are not taught by the combination of references for the reasons stated above in relation to claim 1.

Claim 10 further recites:

> "final machining the gas turbine engine component, wherein the thick portion has a 0.2 percent yield strength of from about 120 ksi to about 140 ksi at its centerline, and a 0.2 percent yield strength of from about 160 ksi to about 175 ksi at a location about 1/2 inch below a surface thereof."

None of the references have any such teaching. Because Chakrabarti teaches thin forged sections with a maximum dimension of only 1-inch thickness (only 44 percent of the minimum thickness recited in the claims), Chakrabarti can have no teaching regarding this claim limitation. The claim limitation recites a relatively low yield strength at the centerline of the forged article, and a relatively higher yield strength at 1/2 inch below the surface. In the case of the 1-inch maximum thickness forging of Chakrabarti, the centerline is exactly 1/2 inch below the surface, so the claim limitation cannot be interpreted because it results in different values at the same location (i.e., the centerline that is also 1/2 inch below the surface). Chakrabarti can have no teaching on this subject.

Dependent claims 21-22 recite in part:

"...the step of final machining includes the step of
removing the alpha-case at a surface of the gas turbine engine component."

None of the references have any such teaching. Chakrabarti and website www.timet.com/timetal6-4frame.html have no teaching on this subject. Adinolfi mentions both final machining and chemical milling, but there is no teaching that the chemical milling is part of the step of final machining. That is, there is no teaching of the location of the chemical milling in the processing sequence.

Ground 2. Claims 6 and 15 are rejected under 35 USC 103 as unpatentable over Chakrabarti '624 in view of website www.timet.com/timetal6-4frame.html and Adinolfi '239, and further in view of ASM Handbook Volume 4 pages 913-923. Applicant traverses this ground of rejection.

Claims 6 and 15 include the limitations of their respective parent claims 1 and 10, which are not taught by the combination of Chakrabarti '624 in view of website www.timet.com/timetal6-4frame.html and Adinolfi '239 for the reasons stated in relation to the Ground 1 rejection, which reasons are incorporated here. ASM Handbook adds nothing of relevance.

The ASM Handbook is nonanalogous art, because it does not deal with thermomechanical processing--it deals with heat-treating only, as is made clear by the title of the section and also the absence of any discussion of forging or other deformation processing. Stated alternatively, ASM Handbook is not within the scope and content of the prior art that may be used in forming a §103 rejection. Its teachings are therefore not properly combined with the teachings of the other references. To be analogous art and properly used in forming a §103 rejection, a reference must be concerned with the same problem as another reference and the claims which are being addressed. Also, Stratoflex, Inc. v. Aeroquip Corp., 218 USPQ 871, 876 (Fed. Cir. 1983), stating: "The scope of the prior art has been defined as that 'reasonably pertinent to the particular problem with which the inventor was involved.'"

In the present case, the inventor was concerned with a problem in processing forged articles; *see* the Specification and the present claims. ASM Handbook has nothing at all to do with forging or the processing of forgings, and therefore is not properly within the scope

of the prior art. Those skilled in the art know that the processing of articles with associated deformation, as in the present claims, is termed "thermomechanical processing" while the processing of articles without associated deformation, as in ASM Handbook, is termed "heat treating." These fields are so different that they are treated in different sections of the literature, including ASM Handbook. The applied ASM Handbook reference deals only with heat-treating, not with thermomechanical processing, and is therefore not properly applied in rejecting the present claims.

But even if ASM Handbook is improperly applied, it teaches away from the present approach. At the very location referenced in the explanation of the rejection, page 917, col. 2 and immediately following the discussion of quench initiation time, ASM Handbook teaches that "When a Ti-6Al-4V section thickness exceeds 75 mm (3 in), it is difficult to cool the center fast enough to maintain an unstable β phase. For this reason, the solution-treated and aged properties of Ti-6Al-4V large sections are similar to annealed properties." This is a teaching that one should not use solution-treating and aging processing for thick sections of greater than 3 inches, because that is a waste of money over simple annealing that produces the same results.

Claims 6 and 15 each incorporates the parent claim limitations, including the recitation of thickness greater than 2-1/4 inches, and therefore ASM Handbook teaches against the limitations of claims 6 and 15.

Additionally, claims 6 and 15 each recites in part:

> "the step of water quenching [of the forged article and solution heat treated article, see parent claim] is initiated within about 20 seconds of completing the step of solution heat treating."

None of the references have any such teaching. The first three references have no such teaching, and ASM Handbook has no teaching of processing of forged articles.

Ground 3. Claims 7 and 16 are rejected under 35 USC 103 as unpatentable over Chakrabarti '624 in view of website www.timet.com/timetal6-4frame.html and Adinolfi '239, and further in view of ASM Handbook Volume 4 pages 913-923. Applicant traverses this ground of rejection.

Applicant incorporates the discussion of the Ground 3 rejection from above.

Claims 7 and 16 include the limitations of their respective parent claims 1 and 10, which are not taught by the combination of Chakrabarti '624 in view of website

www.timet.com/timetal6-4frame.html and Adinolfi '239 for the reasons stated in relation to the Ground 2 rejection, which reasons are incorporated here.

The ASM Handbook is nonanalogous art, because it does not deal with thermomechanical processing--it is heat-treating only, as is made clear by the title of the section and also the absence of any discussion of forging. Stated alternatively, ASM Handbook is not within the scope and content of the prior art that may be used in forming a §103 rejection. Its teachings are therefore not properly combined with the teachings of the other references. To be analogous art and properly used in forming a §103 rejection, a reference must be concerned with the same problem as another reference and the claims which are being addressed. Also, Stratoflex, Inc. v. Aeroquip Corp., 218 USPQ 871, 876 (Fed. Cir. 1983), stating: "The scope of the prior art has been defined as that 'reasonably pertinent to the particular problem with which the inventor was involved.'" In the present case, the inventor was concerned with a problem in processing forged articles; *see* the Specification and the present claims. ASM Handbook has nothing at all to do with forging or the processing of forgings, and therefore is not properly within the scope of the prior art. The processing of articles with associated deformation, as in the present claims, is termed "thermomechanical processing" while the processing of articles without associated deformation is termed "heat treating." These fields are so different that they are treated in different sections of the literature, including ASM Handbook. ASM Handbook deals with heat treating, not thermomechanical processing, and is therefore not properly applied in rejecting the present claims.

But even if ASM Handbook is improperly applied, it teaches away from the present approach. At the very location referenced in the explanation of the rejection, page 917, col. 2 and immediately following the discussion of quench initiation, ASM Handbook teaches that "When a Ti-6Al-4V section thickness exceeds 75 mm (3 in), it is difficult to cool the center fast enough to maintain an unstable β phase. For this reason, the solution-treated and aged properties of Ti-6Al-4V large sections are similar to annealed properties." This is a teaching that one should not use solution-treating and aging processing for thick sections of greater than 3 inches, because that is a waste of money over simple annealing that produces the same result.

Claims 7 and 16 each incorporates the parent claim limitations, and therefore ASM Handbook teaches against the limitations of claims 6 and 15.

Claims 7 and 16 each recites in part:

> "aging the forged gas turbine engine component for a time of at least about 4 hours."

Chakrabarti teaches that the aging at 1275-1525F is for only 1 hour in the two-step aging process, and the aging at 1275-1325F is only for 2 hours in the one-step aging process; *see* col. 3, lines 35-40. Chakrabarti therefore does not teach the presently claimed approach. The website www.timet.com/timetal6-4frame.html does not relate to thermomechanical processing such as forging, and its teachings are not relevant. ASM Handbook does not relate to thermomechanical processing such as forging, and its teachings are not relevant.

Ground 4. Claims 8-9 and 17-18 are rejected under 35 USC 103 as unpatentable over Chakrabarti '624 in view of website www.timet.com/timetal6-4frame.html and Adinolfi '239, and further in view of Bewlay U.S. Patent 6,370,956. Applicant traverses this ground of rejection.

Claims 8-9 and 17-18 include the limitations of their respective parent claims, which are not taught by the combination of Chakrabarti '624 in view of website www.timet.com/timetal6-4frame.html and Adinolfi '239 for the reasons stated in relation to the Ground 1 and Ground 2 rejections, which reasons are incorporated here.

Bewlay teaches away from the presently claimed approach by teaching the use of Ti6242 alloy, teaching forging to thin sections, and teaching an absence of post-forging heat treating of the type recited in the present claims. Regarding alloy type, as stated in Table 5 of ASM Handbook, Ti6242 is an alpha or near-alpha titanium alloy, and Ti64 is an alpha-beta titanium alloy. These are two different types of alloy systems, and there is no basis for applying the teachings of Bewlay about Ti6242 to the T64 alloys of the present claims. The explanation of the rejection references the teaching of forging in Bewlay at col. 6, lines 1-14. At this location, Bewlay teaches (col. 6, line 10) that the thickness of its forgings is 2.8 cm (about 1.1 inch), roughly the same thin forging as taught by Chakrabarti, and in both cases much less than the minimum thickness recited in the present claims. Regarding heat treating, Bewlay teaches no post-forging heat treating by solution heat treating, water quenching, and aging as recited in the present claims.

Chakrabarti '624, the website www.timet.com/timetal6-4frame.html, and Adinolfi '239 have no teaching of ultrasonically inspecting. Bewlay is relied upon for its purported teaching of ultrasonically inspecting.

Each of claims 8 and 17 recites in part:

"an additional step, after the step of forging the workpiece [made of the Ti64-type alloy specified in the parent claim] and before the step of heat treating, of

ultrasonically inspecting the forged gas turbine engine component."

Bewlay teaches, at col. 5, lines 60-67, ultrasonic inspecting a material that is made of a completely different alloy type, and certainly not Ti64-type alloy. As stated in Table 5 of ASM, Ti6242 is an alpha or near-alpha titanium alloy, and Ti64 is an alpha-beta titanium alloy. From these characterizations flow entirely different processing approaches. Further, there is no indication in Bewlay that the ultrasonic inspection taught at col. 5, lines 60-67 is performed "after the step of forging the workpiece and before the step of heat treating" as recited. Applicant has studied the portion of Bewlay following col. 5, lines 60-67 and cannot find that the specimens selected for ultrasonic inspection as described at col. 5, lines 60-67 were ever subsequently heat treated, and specifically not heat treated in any manner as recited in the respective parent claims. If the rejection is maintained, Applicant asks that the Examiner point out where there is a teaching that the specimens ultrasonic tested at col. 5, lines 60-67 were ever subsequently heat treated by the steps recited in the respective parent claims of claims 8 and 17. A teaching of such a subsequent heat treatment is required to satisfy that portion of the recitation.

Each of claims 9 and 18 recites in part:

"an additional step, after the step of heat treating and before the step of final machining, of

ultrasonically inspecting the forged gas turbine engine component."

Bewlay does not arguably have such a teaching, for any alloy or for any heat treatment; much less the alloy and heat treatments recited in the parents of claims 9 and 18. Nothing in the explanation of the rejection suggests that Bewlay has any such teaching. The explanation of the rejection lumps claims 9 and 18 with claims 8 and 17, but there is no basis for this.

The explanation of the rejection references a statement regarding "press forging at 900C (heat treatment)." To the extent that teaching is attempted by the Examiner in reliance to satisfy the subsequent heat treatment, it will be noted that the forging is a different recited step than the heat treating in the present claims and that the heat treating is separated by "thereafter" from the forging. Thus this teaching regarding forging cannot be used for the heat treatment limitation.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Applicant submits that the application is in condition for allowance, and requests such allowance.

CONCLUSION

For at least the reasons set forth above, Applicant respectfully requests reconsideration of the Application and withdrawal of all outstanding rejections. Applicant requests allowance of all pending claims in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant's undersigned representative.

This Response has been filed within three (3) months of the mailing date of the Office Action and it is believed that no fees are due with the filing of this paper. In the event that Applicant is mistaken in these calculations, the Commissioner is hereby authorized to deduct any fees determined by the Patent Office to be due from the undersigned's Deposit Account No. 50-1059.

Respectfully submitted,

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